# Doctoral candidate 2: Accelerated edge-illumination-based phase contrast for smart material inspection

**Host Institution**       University of Antwerp, Belgium
**PhD enrolment**       University of Antwerp, Belgium
**Primary Supervisor**     Prof. dr. Jan De Beenhouwer
**Subject area**        3D reconstruction, phase contrast, X-ray imaging

## About this doctoral project and your tasks

Phase contrast imaging based on edge illumination (EI) is emerging as a technique to generate high contrast images of different materials. EI extracts phase information by shifting two absorption masks while placing the object in between. For each view, multiple projections are acquired, yielding three contrasts: absorption, refraction, and dark field. Traditional tomographic reconstruction, like Filtered Back Projection (FBP), demands dense sampling of the illumination curve at each detector pixel, leading to lengthy scans. Recent developments offer iterative EI reconstruction methods without explicit phase retrieval.

Your task will be to develop a 3D X-ray phase contrast reconstruction method that simultaneously takes into account the different contrasts that we obtain with this imaging technique, including a directional dark field model. The developed method will then be applied to the imaging and characterisation of advanced materials such as hydrogels.

## Foreseen secondments

For this project, we foresee secondments to:

- Dr. W. Twengstrom (2 months) at Excillum (Sweden)
- Dr. R. Mokso (3 months) at Technical University of Denmark

## About the host institution and research group

The Univserp is a dynamic, forward-thinking university in the second largest city in Belgium. We offer an innovative academic education to more than 20000 students, conduct pioneering scientific research and play an important service-providing role in society. With more than 6000 employees from 100 different countries, we are helping to build tomorrow's world every day.
Vision Lab is a research group of the Physics department at the University of Antwerp. The Vision Lab has unique expertise in reconstruction, processing and analysis of imaging data. The working environment is strongly interdisciplinary, combining techniques and insights from Physics, Engineering, Mathematics and Computer Science.

The group has a broad range of national and international collaborations with both academic and industrial partners. More details on Vision Lab's research are available at http://visielab.uantwerpen.be.

## About the offer

- The selected candidate will be employed by University of Antwerp for **36 months** on the MSCA-DN project. In line with university regulations and following a positive evaluation by the doctoral committee, University of Antwerp may provide additional funding for a maximum of 12 months to complete the doctoral degree.
- Doctoral candidates are offered a **competitive remuneration** based on the MSCA allowances and the regulations of the host institution. The gross monthly amount at the University of Antwerp corresponds to the amount for doctoral scholarship holders. Moreover, funding is available for technical and personal skills training and participation in international research events.
- **Expected start date**: between April and September 2026. We encourage last-year master students who will graduate by this time to already apply.

More information is available in the general information document for X-CELERATE positions.

## Specific Profile requirements

- Your profile aligns with the general requirements and eligibility criteria of the X-CELERATE project.
- You have a master's degree in **physics, computer science, mathematics, engineering, or related field** (or will have by the time of your appointment).
- Background in **scientific computing and/or computed tomography** is appreciated.
- You are proficient in at least one **programming language**.

## How to apply

All applications must be submitted via the **X-CELERATE job platform**

**Deadline for applications: January 25, 2026 23:59.** More information about the application procedure is available in the general information document for X-CELERATE positions.

## Additional information

For additional information about the research project, contact:

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